

PATENT ABSTRACTS OF JAPAN

(11)Publication number : H05-068529

(43)Date of publication of application : 23.03.1993

(51)Int.CI.

C12C 5/02

(21)Application number : 03-201210

(71)Applicant : SAPPORO BREWERIES LTD

(22)Date of filing : 17.07.1991

(72)Inventor : SEKIHASHI SATOSHI
SEKINE TAKATOSHI
MURAKAMI ATSUSHI

(54) PRODUCTION OF LOW-ALCOHOL BEER

(57)Abstract:

PURPOSE: To economically and efficiently obtain a low-alcohol beer having a flavor and full of body by adding α -glucosidase to wort in a fermentation process in beer production.

CONSTITUTION: In a fermentation process in beer production, α -glucosidase is added to wort and fermentable saccharides in the wort are converted to non-fermentable saccharides to provide the objective low-alcohol beer suppressed in alcohol producing amount, solved the problems of simplicity, deficiency of flavor and full of body, etc., and having a flavor and full of body comparable to conventional beer containing 4.5-5.0% alcohol. Furthermore, malt is preferably used in a ratio of 66.7 to 100%.

LEGAL STATUS

[Date of request for examination] 07.07.1998

[Date of sending the examiner's decision of rejection] 03.10.2000

CLAIMS

[Claim(s)]

[Claim 1] The manufacture approach of the low alcohol beer characterized by adding the alpha-glucosidase in the brewing process in the Biel manufacture.

[Claim 2] The manufacture approach according to claim 1 which is 66.7 – 100% of malt activity ratios.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the manufacture approach of the low alcohol beer characterized by adding the alpha-glucosidase in the Biel production process about the manufacture approach of low alcohol beer in detail.

[0002]

[Description of the Prior Art] To the sales of an alcoholic beverage with alcoholic high concentration, such as whiskey and white distilled liquor, decreasing in recent years, an alcoholic beverage is low-alcoholized so that clearly from alcoholic beverages of low alcohol, such as Biel, wine, and liqueur, lengthening sales. It will be expected from now on that a spur starts low alcoholization of an alcoholic beverage further, and expansion of a commercial scene will be expected like the West in Biel which is the representation of a low alcoholic alcoholic beverage especially.

[0003] Alcoholic concentration is 4.5–5.0 and usual Biel has moderate ****, substance, etc. However, those who cannot take in this Biel by the reason of illness and others get down, and offering low alcohol beer for such people is performed conventionally. As the low alcoholization approach of Biel currently more generally than before performed, the distillation which removes an alcohol content from Biel, dialysis, the approach of controlling fermentation as much as possible, the approach (JP,50-29795,A) using an asymmetrical type reverse osmotic membrane, etc. are learned well.

[0004] However, the loss of energy of distillation is large the top which needs expensive equipment. Moreover, since proteinic denaturation arises in order to process at an elevated temperature, or change of the matter which influences the taste and aroma takes place, a satisfactory flavor is not acquired.

[0005] Moreover, since dialysis is the driving force of dialysis of diffusion of alcohol, extent of matter exchange is decided by the concentration gradient of alcohol. Therefore, processing takes time amount very much and there is a fault that effectiveness is bad. Extractives must be included in dialysing fluid by suitable concentration that permeable membrane processing is required in order to remove alcohol moreover, and transparency of extractives should be controlled in order that the content matter of the low molecular weight which is some extractives may pass the film with alcohol in that case. Since it becomes inadequate fermenting the approach of controlling fermentation as much as possible, many saccharides remain, and aging is inadequate, and when the flavor of wort is conspicuous, the flavor as Biel is also inadequate [obtained Biel].

[0006] Furthermore, by the approach using an asymmetrical type reverse osmotic membrane,

operating pressure needs 30–50kg/cm², and the high pressure and the expensive equipment which are, and it has a fault, like the bad influence of the component which a running cost starts upwards and is contained by high pressure all over Biel deteriorating comes out. Thus, the present condition is that the method of manufacturing the low alcohol beer which quality satisfies economically and efficiently is not yet established.

[0007]

[Means for Solving the Problem] As a result of repeating research that the approach of manufacturing economically and efficiently the low alcohol beer which solved the above-mentioned technical problem should be developed, when using the alpha-glucosidase at the production process, especially brewing process of Biel, this invention person could convert the fermentable sugars in wort into unfermentative sugar, and completed a header and this invention for the ability of the amount of alcoholic generation to be controlled.

[0008] That is, this invention offers the manufacture approach of the low alcohol beer characterized by adding the alpha-glucosidase in the brewing process in the Biel manufacture.

[0009] In this invention, low alcohol beer means the thing in the range whose alcoholic content is 1.0 – 4.0%. The low alcohol beer of this invention is obtained by adding the alpha-glucosidase in the brewing process in the usual Biel manufacture.

[0010] What is necessary is to be able to use the thing of the various origins for arbitration and just to use a commercial item as alpha-glucosidase. Moreover, it may be any which also fixed the configuration in a liquid, powder, and support. Although especially the addition stage of the alpha-glucosidase is not restricted, it is required for the brewing process before fermentation to add to the wort whose wort extractives concentration is 4.5 – 10%. If a flavor becomes frank for wort extractives concentration to be less than 4.5% and it exceeds 10% on the other hand preferably here, since non-fermentability extractives will become high and a wort smell and the taste will come out, it is not desirable.

[0011] Thus, the fermentable sugars in wort are converted into unfermentative sugar by adding the alpha-glucosidase at the brewing process before fermentation. Specifically, a glucose, fructose, shoe cloth, a maltose, a maltotriose, etc. are converted into a kojibiose, the nigerose, isomaltose, ERUROSU, a panose, isomalt triose, etc. Therefore, these unfermentative sugar can cancel the lightness which is the demerit of low alcohol beer, the lack of a taste, the lack of Quoc, etc., when it is not used for fermentation but the amount of alcoholic generation can be controlled, and it can give the same taste as ordinary Biel (4.5 – 5.0% of alcoholic concentration), and substance.

[0012] Although what is necessary is just to determine the addition of the alpha-glucosidase in consideration of the concentration of the fermentable sugars in the wort before fermentation, 300ml per kl (100 million units) of 360ml (120 million units) extent is usually preferably suitable for it. Moreover, although an addition may be determined according to the purpose since the alcoholic concentration of a product is changeable with the addition of the alpha-glucosidase, 240ml per kl (80 million units) needs to add also in this case. The alpha-glucosidase may be added at once into the wort before fermentation, and may be added in several steps.

[0013] Moreover, in this invention, still higher quality low alcohol beer can be manufactured by being independent, or combining a protease, alpha-amylase, the beta-amylase, two or more sorts of pullulanase, etc., and adding with the alpha-glucosidase.

[0014] The low alcohol beer of this invention is obtained as mentioned above by adding the alpha-glucosidase in the brewing process in the manufacturing method of usual Biel, and does not need a facility of a special plant etc., and the trouble of said conventional method of loss of energy, the badness of effectiveness, the difficulty of conditioning, heat, the denaturation of the component by the pressure, etc. is not brought about further. Other than adding the alpha-glucosidase in a brewing process, low alcohol beer does not carry out the need of the special conditions at all, and does not need a facility or approach of a special plant etc. at all. Therefore, when the approach of this invention hardly changes a running cost to the former, either, since the sugar transition reaction by the alpha-glucosidase advances quickly, it does not almost have the futility of time amount, either.

[0015]

[Example] Next, an example explains this invention.

Using the brewing facility (about 500 liter capacity) of example 1 pilot scale, 150ml (about 50 million units) was added for the alpha-glucosidase at the brewing process in 10.88% of original wort extractives, and low alcohol beer was manufactured with the conventional method. On the other hand, low alcohol beer was manufactured with the conventional method as contrast, without adding the alpha-glucosidase. Both analysis result is shown in Table 1.

[0016]

[Table 1]

table 1 [] A contrast article this invention article	Original wort extractives (%) 10.9
Intrinsic extractives (%) 3.2	6.3
An intrinsic fermentation degree (%) 70.4	
42.0 Alcohol (V/V %) 5.0	3.0 pH 4.4
4.6	

[0017] In example 2 example 1, low alcohol beer was manufactured like the example 1 except having used the original wort extractives 9.5% thing. A result is shown in Table 2.

[0018]

[Table 2]

table 2 [] A contrast article this invention article	Intrinsic extractives (%) 3.1
5.9	An intrinsic fermentation degree (%) 67.4
37.9	Alcohol (V/V %) 4.1
2.4 pH 4.8	
4.8	

[0019] an example 3 small trial -- saccharification -- using equipment (about 500 liter capacity), 0.3ml (about 100,000 units) was added for the alpha-glucosidase at the brewing process in 11.0% of original wort extractives, and low alcohol beer was manufactured with the conventional method. On the other hand, low alcohol beer was manufactured with the conventional method as contrast, without adding the alpha-glucosidase. Both analysis result is shown in Table 3.

[0020]

[Table 3]

table 3 [] A contrast article this invention article	Original wort extractives (%) 11.0
11.0	Intrinsic extractives (%) 3.2
6.8	An intrinsic fermentation degree (%) 70.9
38.2	Alcohol (V/V %) 4.9
2.7 pH 4.7	4.6

[0021]

[Effect of the Invention] According to this invention, low alcohol beer can be manufactured economically and efficiently only by adding the alpha-glucosidase in the brewing process in the usual Biel manufacture approach. And the low alcohol beer obtained by this invention can be easily

adjusted to extent of a request of alcoholic concentration upwards, and has the same taste and substance as ordinary Biel.

TECHNICAL FIELD

[Industrial Application] This invention relates to the manufacture approach of the low alcohol beer characterized by adding the alpha-glucosidase in the Biel production process about the manufacture approach of low alcohol beer in detail.

EFFECT OF THE INVENTION

[Effect of the Invention] According to this invention, low alcohol beer can be manufactured economically and efficiently only by adding the alpha-glucosidase in the brewing process in the usual Biel manufacture approach. And the low alcohol beer obtained by this invention can be easily adjusted to extent of a request of alcoholic concentration upwards, and has the same taste and substance as ordinary Biel.

TECHNICAL PROBLEM

[Description of the Prior Art] To the sales of an alcoholic beverage with alcoholic high concentration, such as whiskey and white distilled liquor, decreasing in recent years, an alcoholic beverage is low-alcoholized so that clearly from alcoholic beverages of low alcohol, such as Biel, wine, and liqueur, lengthening sales. It will be expected from now on that a spur starts low alcoholization of an alcoholic beverage further, and expansion of a commercial scene will be expected like the West in Biel which is the representation of a low alcoholic alcoholic beverage especially.

[0003] Alcoholic concentration is 4.5-5.0 and usual Biel has moderate ***, substance, etc. However, those who cannot take in this Biel by the reason of illness and others get down, and offering low alcohol beer for such people is performed conventionally. As the low alcoholization approach of Biel currently more generally than before performed, the distillation which removes an alcohol content from Biel, dialysis, the approach of controlling fermentation as much as possible, the approach (JP,50-29795,A) using an asymmetrical type reverse osmotic membrane, etc. are learned well.

[0004] However, the loss of energy of distillation is large the top which needs expensive equipment. Moreover, since proteinic denaturation arises in order to process at an elevated temperature, or change of the matter which influences the taste and aroma takes place, a satisfactory flavor is not acquired.

[0005] Moreover, since dialysis is the driving force of dialysis of diffusion of alcohol, extent of matter exchange is decided by the concentration gradient of alcohol. Therefore, processing takes time amount very much and there is a fault that effectiveness is bad. Extractives must be included in dialysing fluid by suitable concentration that permeable membrane processing is required in order to remove alcohol moreover, and transparency of extractives should be controlled in order that the content matter of the low molecular weight which is some extractives may pass the film with alcohol

in that case. Since it becomes inadequate fermenting the approach of controlling fermentation as much as possible, many saccharides remain, and aging is inadequate, and when the flavor of wort is conspicuous, the flavor as Biel is also inadequate [obtained Biel].

[0006] Furthermore, by the approach using an asymmetrical type reverse osmotic membrane, operating pressure needs 30–50kg/cm², and the high pressure and the expensive equipment which are, and it has a fault, like the bad influence of the component which a running cost starts upwards and is contained by high pressure all over Biel deteriorating comes out. Thus, the present condition is that the method of manufacturing the low alcohol beer which quality satisfies economically and efficiently is not yet established.

MEANS

[Means for Solving the Problem] As a result of repeating research that the approach of manufacturing economically and efficiently the low alcohol beer which solved the above-mentioned technical problem should be developed, when using the alpha-glucosidase at the production process, especially brewing process of Biel, this invention person could convert the fermentable sugars in wort into unfermentative sugar, and completed a header and this invention for the ability of the amount of alcoholic generation to be controlled.

[0008] That is, this invention offers the manufacture approach of the low alcohol beer characterized by adding the alpha-glucosidase in the brewing process in the Biel manufacture.

[0009] In this invention, low alcohol beer means the thing in the range whose alcoholic content is 1.0 – 4.0%. The low alcohol beer of this invention is obtained by adding the alpha-glucosidase in the brewing process in the usual Biel manufacture.

[0010] What is necessary is to be able to use the thing of the various origins for arbitration and just to use a commercial item as alpha-glucosidase. Moreover, it may be any which also fixed the configuration in a liquid, powder, and support. Although especially the addition stage of the alpha-glucosidase is not restricted, it is required for the brewing process before fermentation to add to the wort whose wort extractives concentration is 4.5 – 10%. If a flavor becomes frank for wort extractives concentration to be less than 4.5% and it exceeds 10% on the other hand preferably here, since non-fermentability extractives will become high and a wort smell and the taste will come out, it is not desirable.

[0011] Thus, the fermentable sugars in wort are converted into unfermentative sugar by adding the alpha-glucosidase at the brewing process before fermentation. Specifically, a glucose, fructose, shoe cloth, a maltose, a maltotriose, etc. are converted into a kojibiose, the nigerose, isomaltose, ERUROSU, a panose, isomalt triose, etc. Therefore, these unfermentative sugar can cancel the lightness which is the demerit of low alcohol beer, the lack of a taste, the lack of Quoc, etc., when it is not used for fermentation but the amount of alcoholic generation can be controlled, and it can give the same taste as ordinary Biel (4.5 – 5.0% of alcoholic concentration), and substance.

[0012] Although what is necessary is just to determine the addition of the alpha-glucosidase in consideration of the concentration of the fermentable sugars in the wort before fermentation, 300ml per kl (100 million units) of 360ml (120 million units) extent is usually preferably suitable for it. Moreover, although an addition may be determined according to the purpose since the alcoholic

concentration of a product is changeable with the addition of the alpha-glucosidase, 240ml per kl (80 million units) needs to add also in this case. The alpha-glucosidase may be added at once into the wort before fermentation, and may be added in several steps.

[0013] Moreover, in this invention, still higher quality low alcohol beer can be manufactured by being independent, or combining a protease, alpha-amylase, the beta-amylase, two or more sorts of pullulanase, etc., and adding with the alpha-glucosidase.

[0014] The low alcohol beer of this invention is obtained as mentioned above by adding the alpha-glucosidase in the brewing process in the manufacturing method of usual Biel, and does not need a facility of a special plant etc., and the trouble of said conventional method of loss of energy, the badness of effectiveness, the difficulty of conditioning, heat, the denaturation of the component by the pressure, etc. is not brought about further. Other than adding the alpha-glucosidase in a brewing process, low alcohol beer does not carry out the need of the special conditions at all, and does not need a facility or approach of a special plant etc. at all. Therefore, when the approach of this invention hardly changes a running cost to the former, either, since the sugar transition reaction by the alpha-glucosidase advances quickly, it does not almost have the futility of time amount, either.

* NOTICES *

**JPO and NCIP are not responsible for any
damages caused by the use of this translation.**

1. This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
3. In the drawings, any words are not translated.

EXAMPLE

[Example] Next, an example explains this invention.

Using the brewing facility (about 500 liter capacity) of example 1 pilot scale, 150ml (about 50 million units) was added for the alpha-glucosidase at the brewing process in 10.88% of original wort extractives, and low alcohol beer was manufactured with the conventional method. On the other hand, low alcohol beer was manufactured with the conventional method as contrast, without adding the alpha-glucosidase. Both analysis result is shown in Table 1.

[0016]

[Table 1]

table 1 [] A contrast article this invention article -----	Original wort extractives (%) 10.9
10.9 Intrinsic extractives (%) 3.2	6.3 An intrinsic fermentation degree (%) 70.4
42.0 Alcohol (V/V %) 5.0	3.0 pH4.4 4.6 ----- [0017] In example 2
example 1, low alcohol beer was manufactured like the example 1 except having used the original wort extractives 9.5% thing. A result is shown in Table 2.	

[0018]

[Table 2]

table 2 [] A contrast article this invention article ----- Intrinsic extractives (%) 3.1 5.9 An intrinsic fermentation degree (%) 67.4 37.9 Alcohol (V/V %) 4.1 2.4 pH 4.8 4.8 ----- [0019] an example 3 small trial -- saccharification -- using equipment (about 500 liter capacity), 0.3ml (about 100,000 units) was added for the alpha-glucosidase at the brewing process in 11.0% of original wort extractives, and low alcohol beer was manufactured with the conventional method. On the other hand, low alcohol beer was manufactured with the conventional method as contrast, without adding the alpha-glucosidase. Both analysis result is shown in Table 3.

[0020]

[Table 3]

table 3 [] A contrast article this invention article ----- Original wort extractives (%) 11.0 11.0 Intrinsic extractives (%) 3.2 6.8 An intrinsic fermentation degree (%) 70.9 38.2 Alcohol (V/V %) 4.9 2.7 pH4.7 4.6 -----